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A NEW SPECIES OF THE GENUS *APHRODES* CURTIS FROM THE AZORES (HEMIPTERA, CICADELLIDAE)

By J. A. QUARTAU [1] & P. BORGES [2]

With 15 figures

ABSTRACT. As a result of an ecological project on the existing native laurel forests (*laurisilva*) in the Azores, *Aphrodes hamiltoni* n. sp. was collected using the pitfall technique. The new species was always found beneath the surface litter of these woods and on the following islands: S. Maria, S. Miguel, Terceira, S. Jorge, Pico, Faial and Flores. It appears as an endemic species for the Azores, being readily distinguished from all remaining taxa within *Aphrodes* Curtis by the typical spines in the apical part of the aedeagus. Compared with other endemic Azorean arthropods sampled recently, *Aphrodes hamiltoni* n. sp. is a common species not particularly under threat and appears as a good indicator of sites rich in endemic arthropods. Consequently, the new species will be highly valued in monitoring programmes to evaluate the conservation status of the native forests of the Azores.

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KEY WORDS: *Aphrodes*, Hemiptera, Azores, *laurisilva*.

RESUMO. Aphrodes hamiltoni n. sp. foi colhido através de armadilhas em fosso como resultado de um projecto de investigação sobre as comunidades de insectos associados à *laurisilva* ainda presente nas ilhas dos Açores. A nova espécie foi sempre colhida sob a manta morta destas florestas e nas seguintes ilhas: S. Maria, S. Miguel, Terceira, S. Jorge, Pico, Faial e Flores. Este novo cicadelídeo é certamente uma espécie endémica para os Açores. Distingue-se facilmente das restantes espécies do género *Aphrodes* Curtis pelos espinhos peculiares da parte apical do edeago. Em comparação com outros artrópodes endémicos dos Açores, que têm sido investigados recentemente, *Aphrodes hamiltoni* n. sp. é uma espécie comum, sem estar particularmente ameaçada, e que parece ser uma boa indicadora dos biótopos com elevada diversidade de artrópodes endémicos. Consequentemente, esta nova espécie tem elevado valor para ser utilizada em programas de monitorização com vista à avaliação do estado de conservação dos florestas nativas dos Açores.

INTRODUCTION

HAMILTON (1975) split the genus *Aphrodes* Curtis into three genera, viz. *Aphrodes* Curtis *s. str.*, *Anoscopus* Kirschbaum and *Planaphrodes* Hamilton. These are small to medium-sized leafhoppers with the head usually emarginated beneath the eyes and of which one species only, *Anoscopus albifrons* (Linnaeus, 1758), was previously known from the Azores (QUARTAU, 1979). These leafhoppers are associated with herbaceous and other plants and many species are known to feed on roots beneath the surface litter.

The new species described below was found as a result of an ecological project (BALA – "Biodiversity of Arthropods of the *Laurisilva* of the Azores") focused on the Azorean Natural Forest Reserves and dealing with the insect communities of the native laurel forests (*laurisilva*) still present in these islands (for details see BORGES *et al.*, 2000; 2002). This vegetation is of great scientific interest since some of its elements are closely related to species that in the Terciary were present in the western European flora. These remaining areas of laurel woods consist of large evergreen trees and shrubs such as *Juniperus brevifolia* (cedro-do-mato), *Laurus azorica* (loureiro), *Ilex perado azorica* (azevinho), *Erica azorica* (urze) and *Myrica faya* (faia-das-ilhas), among other species (*e. g.*, SJÖGREN, 1984; PENA & CABRAL, 1997). Specimens, both nymphs and adults, were collected by means of pitfall sampling and always beneath the surface litter of the native woods on seven of the Azorean islands: S. Maria, S. Miguel, Terceira, S. Jorge, Pico, Faial and Flores. For the present purposes, twenty males and two females were studied based on material from the following islands: S. Miguel, Terceira, Pico, Faial and Flores.

***Aphrodes hamiltoni* n. sp.** (Figs. 1-15)

Diagnosis

This new species is readily distinguished from all remaining taxa within *Aphrodes* Curtis mostly by the typical spines in the apical part of the aedeagus (Figs. 6-13). It largely resembles *Anoscopus serratulae* (Fabricius, 1775) in the aedeagus, but these species are easily separated by the two pairs of spines, which are quite different (*cf.*, for instance, figs. 295-296 of Le QUESNE, 1965). Concerning the remaining leafhoppers present on the Azores, the closest species is A*noscopus albifrons* (Linnaeus, 1758), which has got the two pairs of spines of the aedeagus in quite different positions, besides other differences such as in the structure of the head, as shown in Le QUESNE (1965: figs. 284 and 291-292). In crown and pronotum the new species somewhat resembles *A. brachypterus* (China, 1938), from Madeira Island (*cf.* fig. 16 of CHINA, 1938), but it is much smaller, both sexes are macropterous and the female 7th abdominal sternite has a V-shaped incision. It is also readily separated from *Aphrodes petrophilus* Lindberg, 1954, from the Canaries, by the position of the aedeagal spines as shown in figs. 51a-d of LINDBERG (1954).

Description

Male – Length from apex of crown to tips of elytra 4.06 to 4.59 mm (mean 4.30 mm). General body colour brownish, sometimes blackish brown. Crown medially clearly longer than median length of pronotum, with a median carina and a carinate edge between vertex and face (Fig. 1); margin of crown more or less foliaceously produced and eyes not notched laterally near antennal pits (Figs. 1-2).

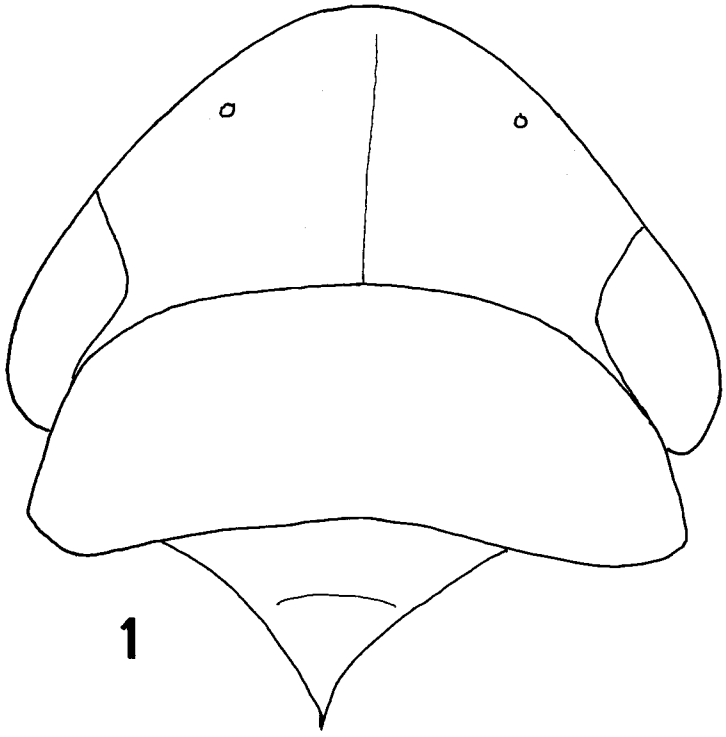
Crown, pronotum and scutellum brownish or dark brown and with blackish mottlings. Forewings from light to more or less dark brownish, with darker mottlings especially on posterior half where there are also lighter spots. Hind femora near apex with three subapical large macrosetae, and hind tibiae with large macrosetae as in *Anoscopus*.

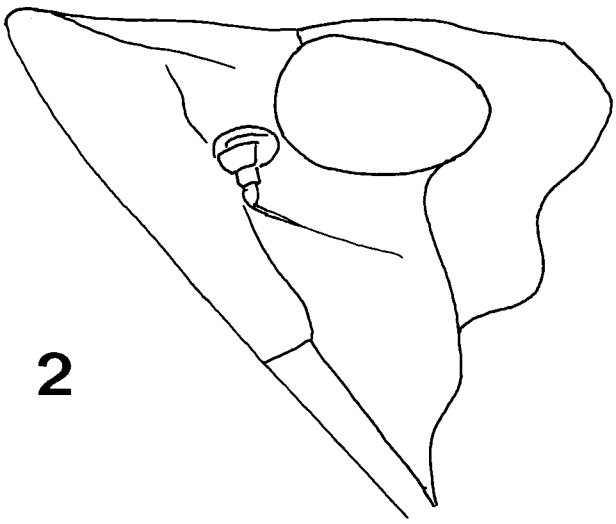
Male pygophore as illustrated and with a process in the form as a claw (Figs.3-4). Genital styles wide and as illustrated (Fig. 5). Male aedeagus (Figs. 6-13) with a slender shaft, approximately cylindrical and apically with a pair of posterior large spiniform appendages, as well as with an anterior second pair of much smaller spines, therefore only resembling roughly the aedeagus of *Anoscopus serratulae* (Fabricius, 1775).

Female – Length 4.93 to 5.19 mm (mean 5.06 mm). External structure and colouration as in male, but slightly bigger (Fig. 14). Hind margin of 7th abdominal sternite with a V-shaped incision as illustrated (Fig. 15).

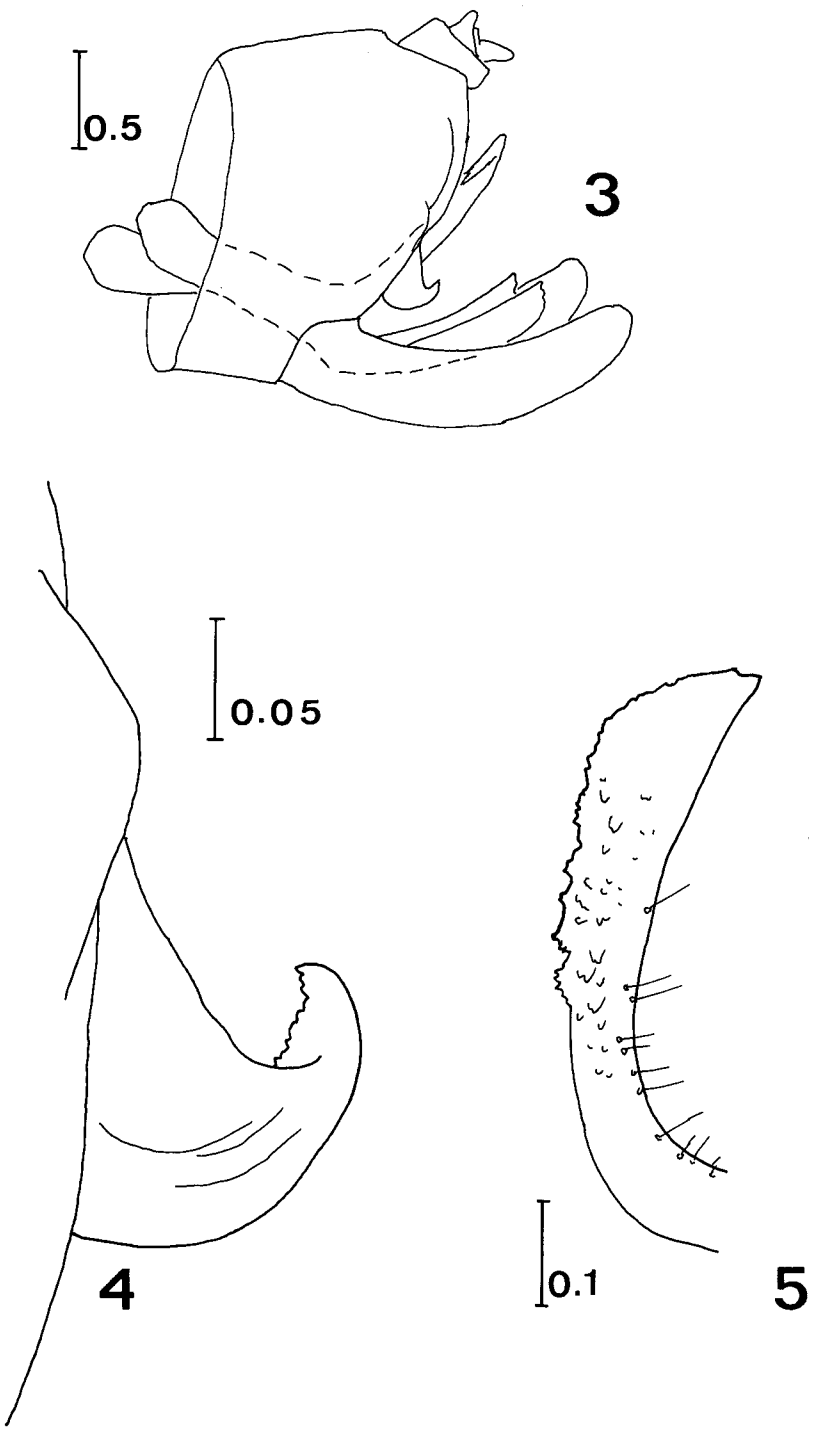
Variability

There is some variation in the general colouration, size and in the male genitalia. For instance, the pair of larger spines in the apical part of the aedeagus show some variation mostly in size, as well as the second smaller spines (Figs. 6-13). It is apparent there is some differentiation at island level, but a paucity of material does not allow at the present stage to establish subspecies or other taxonomic denomination for the different islands.

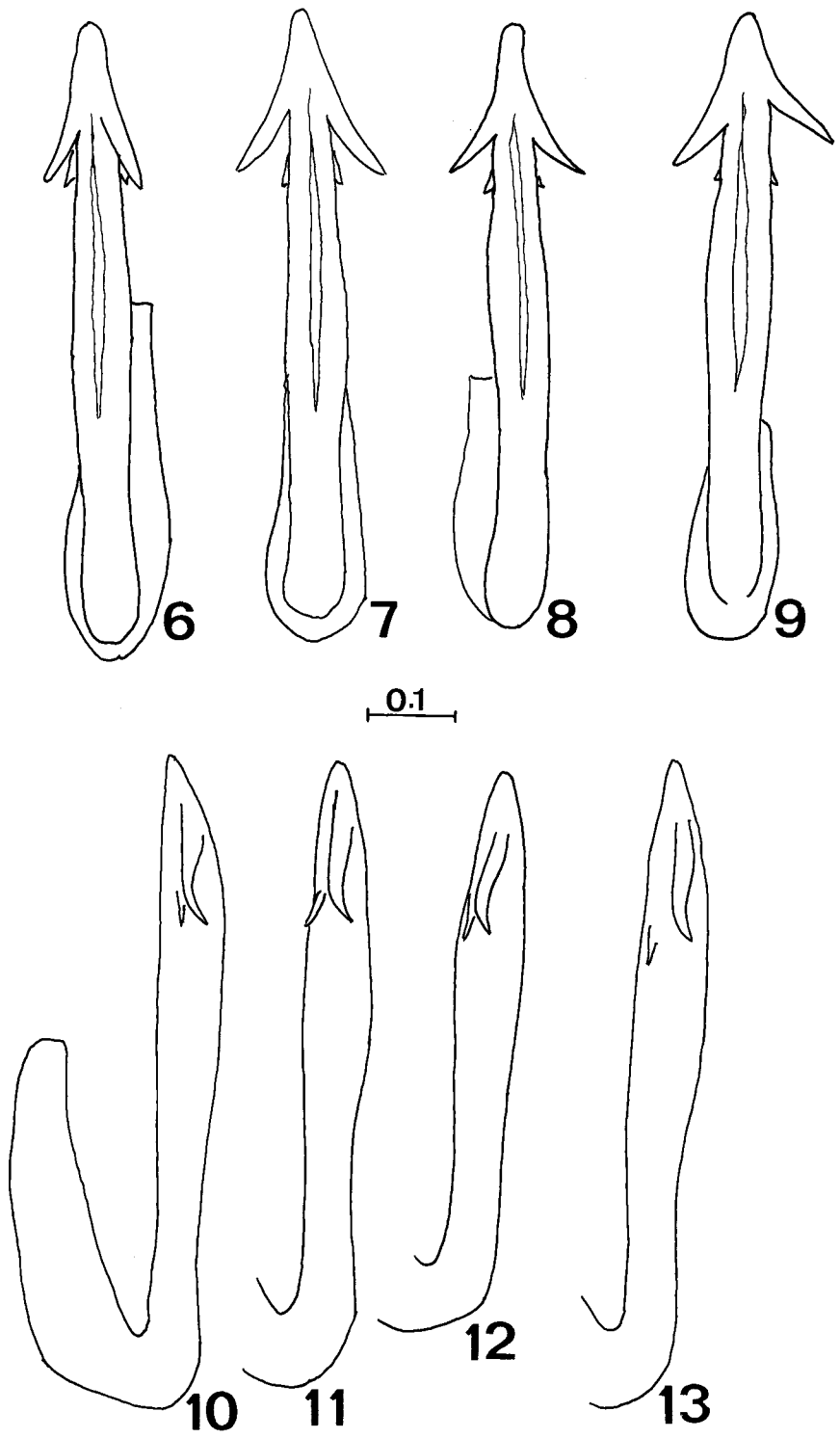




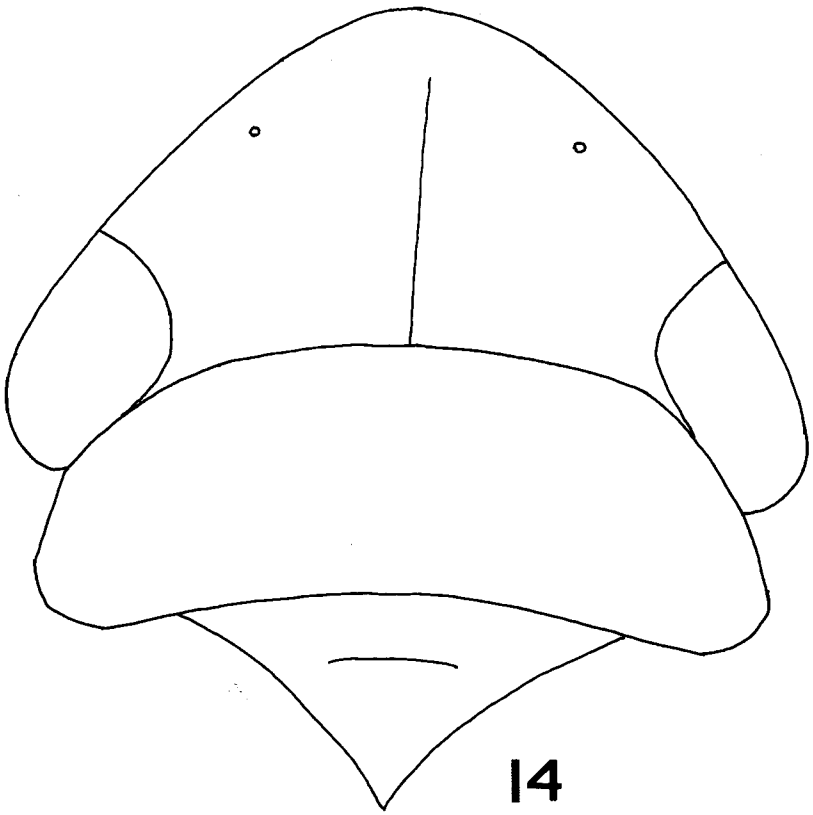
Figs. 1-2 - *Aphrodes hamiltoni* n. sp: 1 - head, pronotum and scutellum of a male, dorsal view (Flores); 2 - same, lateral view. (scale in mm).

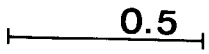


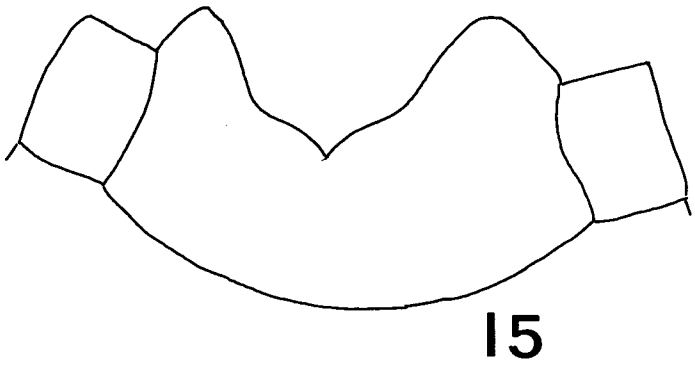
Figs. 3-5 - *Aphrodes hamiltoni* n. sp: 3 - male pygophore and anal apparatus, left lateral view, without setae (S. Miguel); 4 - process of left pygophore lobe, left lateral view (S. Miguel); 5 - right genital style, latero-dorsal view (S. Miguel). (scales in mm).



Figs. 6-13 - Aedeagus of *Aphrodes hamiltoni* n. sp: 6-9 in posterior view and 10-13 in left lateral view: 6, 10 (Pico); 7, 11 (Flores); 8, 12 (Terceira) and 9, 13 (S. Miguel). (scale in mm).







Figs. 14-15 - *Aphrodes hamiltoni* n. sp: 14 - head, pronotum and scutellum of a female (Terceira), dorsal view; 15 - female seventh sternite, ventral view (Terceira). (scale in mm).

Material examined

Holotype male, S. Miguel, Pico da Vara, Tronqueira, 4-22.9.1999, col. P. Borges. Allotype, Terceira, Sta. Bárbara, 9-23.6.1999, col. P. Borges.

Paratypes: *S. Miguel*, Pico da Vara, Tronqueira, 1 male, 4-22.9.1999, col. P. Borges; *Terceira*, Santa Bárbara, 1 male, 1 female, 9-23.6.1999; Lagoa do Pinheiro (Caldeira da Serra de S. Bárbara), 1 male, 19.8-2.9.1999; Lomba, 1 male, 12-26.8.1999, col. P. Borges; *Pico*, Mistério da Prainha, Chão Verde, 2 males, 24.8-19.9.1999; Mistério da Prainha, Planalto, 4 males, 1-19.9.1999; Lagoa do Caiado, 1 male, 27.8-19.9.1999; Caveiro, 1 male, 27.8-19.9.1999, col. P. Borges; *Faial*, Cabeço Fogo, Caldeira, 1 male, 26.8-20.9.1999, col. P. Borges; *Flores*, Caldeira Funda Rasa, 5 males, 23.7-12.8.1999; Morro Alto, 1 male, 21.7-11 8.1999, col. P. Borges. Holotype and most paratypes in the collection of the first author, a few paratypes also with the second author (University of the Azores).

Etymology

The species has been named after our colleague cicadologist Dr. K. G. A. HAMILTON (Ontario, Canada).

Ecology

The new species is associated with the remaining laurel forests (*laurisilva*) in the Azores, having been always collected beneath the surface litter through pitfall traps. It was found almost exclusively in the natural reserves of the Azores, where floristic elements such as *Juniperus brevifolia*, *Laurus azorica*, *Myrica faya* and *Erica azorica* predominate.

DISCUSSION

Due to the limited knowledge of the Azorean arthropods (BORGES *et al.*, 2000), we have intensively surveyed 15 Natural Forest Reserves (project BALA) on seven of the nine Azorean islands. As a result of this effort, several new species belonging to different arthropod groups have been found (*e. g.*, BLAS & BORGES, 1999; RIBES & BORGES, 2001; PLATIA & BORGES, 2002; BORGES *et al.*, *in press*). The present leafhopper is the first new species of a cicadellid (Hemiptera) to be found as a result of this ongoing project.

Anoscopus albifrons (Linnaeus, 1758), a related species to *A. hamiltoni* n. sp. occurring also in continental Portugal, was previously known from all the above mentioned seven islands (S. Maria, S. Miguel, Terceira, S. Jorge, Pico, Faial and Flores), but occurs, however, mostly in pasture habitats (see BORGES, 1999a, b). Moreover, *A. albifrons* was always less abundant than the new species (BORGES, *unpublished data*). Other interesting *Aphrodes* species occur in Macaronesia, namely, *A. brachypterus* (China, 1938) from Madeira and *A. petrophilus* Lindberg, 1954 from the Canaries, both of which are readily separated from the new species as referred to before.

The ecology of the new species is still poorly known. The pitfall technique was consistently followed in all islands and the species is apparently more common in Terceira,

Pico and Flores, islands where the *laurisilva* is less disturbed. On the basis of its structure and ecology, *A. hamiltoni* n. sp. is certainly an endemic species for the Azores. Two endemic grasses common in the forest soil of the sites investigated, *Holcus rigidus* and *Agrostis reuteri botelhoi*, are possible candidates as host plants, but this certainly requires further investigation.

Compared with other endemic Azorean arthropods sampled in the Azores, as a result of the BALA project, *Aphrodes hamiltoni* n. sp. is a common species not particularly under threat (ARRAIOL, 2001) and appears as a good indicator of sites rich in endemic arthropods (GISBERT, 2003). Consequently, the new species will be highly valued in monitoring programmes to evaluate the conservation status of the native forests of the Azores.

ACKNOWLEDGEMENTS

We are deeply grateful to all BALA colleagues. Thanks are especially due to Genage André (Lisbon) for a tremendous commitment with the field work. We also thank Dr. K. G. A. Hamilton (Ontario, Canada), for stimulus and help on leafhopper taxonomic issues, as well "Serviços Florestais dos Açores" (Secretaria Regional da Agricultura e Pescas, Azores) and "Governo Regional dos Açores" for financial support under the project "Reservas Florestais dos Açores: Cartografia e Inventariação dos Artrópodes Endémicos dos Açores" (Proj. 17.01 – 080203). Finally, appreciation is also due to a referee whose suggestions have improved the manuscript.

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B O C A G I A N A

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NOTES ON TWO MADEIRA PLANTS

By N. C. H. Krauss [1]

The composite plant «Abundância» (*Eupatorium adenophorum* Spreng.) has been known in Madeira for many years. On July 24, 1962 I collected a second species of *Eupatorium*, *E. riparium* Schultz-Bip., confirmed by the Royal Botanic Garden, Kew, England. This was growing in association with *E. adenophorum* in a damp area along a path near Monte. Both these species of *Eupatorium* are native to Mexico. I have seen *E. riparium* growing along a small stream in a ravine at the Desierto de los Leones, Distrito Federal, in the hills above Mexico City. Both species are pests in grazing land in Hawaii.

On November 7, 1960 I collected specimens of *Ulex minor* Roth (determined by Royal Botanic Garden, Kew) in the grassy hills above Ribeiro Frio. Since then I have seen it also at Encumeada and Santo da Serra. *Ulex europaeus* L. has been known in Madeira for a long time, but I have not seen any records of *U. minor*.

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